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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,470	03/09/2004	Chien-Hsueh Shih	67,200-1169	2284

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EXAMINER

WONG, EDNA

ART UNIT

PAPER NUMBER

1753

DATE MAILED: 06/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/796,470

Applicant(s)

SHIH ET AL.

Examiner

Edna Wong

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

This is in response to the Amendment dated April 12, 2006. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Response to Arguments

Specification

The disclosure has been objected to because of minor informalities.

The objection of the disclosure has been withdrawn in view of Applicants' amendment.

Claim Objections

Claims **1 and 13** have been objected to because of minor informalities.

The objection of claims 1 and 13 has been withdrawn in view of Applicants' amendment.

Claim Rejections - 35 USC § 102

I. Claims **1-4 and 9-10** have been rejected under 35 U.S.C. 102(b) as being anticipated by **Quimby** (US Patent No. 3,554,884).

The rejection of claims 1-4 and 9-10 under 35 U.S.C. 102(b) as being anticipated by Quimby has been withdrawn in view of Applicants' amendment.

II. Claims **13-16** have been rejected under 35 U.S.C. 102(b) as being anticipated by **Quimby** (US Patent No. 3,554,884).

The rejection of claims 13-16 under 35 U.S.C. 102(b) as being anticipated by **Quimby** has been withdrawn in view of Applicants' amendment.

III. Claims **17-20** have been rejected under 35 U.S.C. 102(b) as being anticipated by **Quimby** (US Patent No. 3,554,884).

The rejection of claims 17-20 under 35 U.S.C. 102(b) as being anticipated by **Quimby** has been withdrawn in view of Applicants' amendment.

IV. Claims **1-2 and 4** have been rejected under 35 U.S.C. 102(b) as being anticipated by **Barstad et al.** (US Patent No. 6,444,110 B2) in combination with **BASF Technical Bulletin** ("Pluronic L62D Block Copolymer Surfactant", page 1, © 2002).

The rejection of claims 1-2 and 4 under 35 U.S.C. 102(b) as being anticipated by **Barstad et al.** in combination with **BASF Technical Bulletin** has been withdrawn in view of Applicants' amendment.

V. Claims **13-14 and 16** have been rejected under 35 U.S.C. 102(b) as being anticipated by **Barstad et al.** (US Patent No. 6,444,110 B2) in combination with **BASF Technical Bulletin** ("Pluronic L62D Block Copolymer Surfactant", page 1, © 2002).

The rejection of claims 13-14 and 16 under 35 U.S.C. 102(b) as being anticipated

by Barstad et al. in combination with BASF Technical Bulletin has been withdrawn in view of Applicants' amendment.

VI. Claims **17 and 18** have been rejected under 35 U.S.C. 102(b) as being anticipated by **Barstad et al.** (US Patent No. 6,444,110 B2) in combination with **BASF Technical Bulletin** ("Pluronic L62D Block Copolymer Surfactant", page 1, © 2002).

The rejection of claims 17 and 18 under 35 U.S.C. 102(b) as being anticipated by Barstad et al. in combination with BASF Technical Bulletin has been withdrawn in view of Applicants' amendment.

Claim Rejections - 35 USC § 103

I. Claims **5-8 and 11-12** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **Quimby** (US Patent No. 3,554,884) as applied to claims 1-4 and 9-10 above.

The rejection of claims 5-8 and 11-12 under 35 U.S.C. 103(a) as being unpatentable over Quimby as applied to claims 1-4 and 9-10 above has been withdrawn in view of Applicants' amendment.

II. Claims **3 and 5-12** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **Barstad et al.** (US Patent No. 6,444,110 B2) in combination with **BASF Technical Bulletin** ("Pluronic L62D Block Copolymer Surfactant", page 1, © 2002) as applied to claims 1-2 and 4 above, and further in view of **BASF** ("Surfactants:

Pluronic & Tetronic", pp. 1-37, © 1999).

The rejection of claims 3 and 5-12 under 35 U.S.C. 103(a) as being unpatentable over Barstad et al. in combination with BASF Technical Bulletin as applied to claims 1-2 and 4 above, and further in view of BASF has been withdrawn in view of Applicants' amendment.

III. Claim **15** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **Barstad et al.** (US Patent No. 6,444,110 B2) in combination with **BASF Technical Bulletin** ("Pluronic L62D Block Copolymer Surfactant", page 1, © 2002) as applied to claims 13-14 and 16 above, and further in view of **BASF** ("Surfactants: Pluronic & Tetronic", pp. 1-37, © 1999).

The rejection of claim 15 under 35 U.S.C. 103(a) as being unpatentable over Barstad et al. in combination with BASF Technical Bulletin as applied to claims 13-14 and 16 above, and further in view of BASF has been withdrawn in view of Applicants' amendment.

IV. Claims **19 and 20** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **Barstad et al.** (US Patent No. 6,444,110 B2) in combination with **BASF Technical Bulletin** ("Pluronic L62D Block Copolymer Surfactant", page 1, © 2002) as applied to claims 17 and 18 above, and further in view of **BASF** ("Surfactants: Pluronic & Tetronic", pp. 1-37, © 1999).

The rejection of claims 19 and 20 under 35 U.S.C. 103(a) as being unpatentable over Barstad et al. in combination with BASF Technical Bulletin as applied to claims 17 and 18 above, and further in view of BASF has been withdrawn in view of Applicants' amendment.

Response to Amendment

Claim Objections

Claim 1 is objected to because of the following informalities:

Claim 1

line 7, the word -- and -- should be inserted after the word "solution;".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Electrolyte

I. Claims **1-4 and 9-10** are rejected under 35 U.S.C. 102(e) as being anticipated by

Hardikar (US Patent Application Publication No. 2004/0168928 A1).

Hardikar teaches an electrolyte for copper electroplating with improved wetting of a copper seed layer (page 3, [0028]) and improved deposition uniformly of said electroplated copper (page 3, [0026]), comprising:

(a) an electrolyte solution comprising a copper ion source (= 67 g/L of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) [page 4, [0036]; and page 5, lines 3-7];

(b) a suppressor additive copolymer consisting of ethylene oxide and propylene oxide providing in said electrolyte solution (= 10 mL/L of 20% Pluronic® 31R1) [page 3, [0029]; and page 5, lines 3-7]; and

(c) an accelerator additive provided in said electrolyte solution (= 7 mL/L of 0.1% of sodium salt of 3-mercaptopropane sulfonic acid) [page 4, [0033] to [0035]; and page 5, lines 3-7];

wherein said suppressor additive is at a higher concentration than said accelerator additive (page 5, lines 3-7).

The copolymer is a block copolymer (= block copolymers of ethylene oxide and propylene oxide) [page 3, [0029].

The ethylene oxide is present in said copolymer in a quantity of at least about 60% by weight (= Pluronic® L62LF, L72, L92, L122, 17R1, 25R1, 25R2, 31R1 and 31R2) [page 3, [0029]].

The copolymer is present in said electrolyte solution in a concentration of from about 50 ppm to about 500 ppm (= 0.001 to 10% by weight) [page 3, [0029]].

The ethylene oxide is present in said copolymer in a quantity of about 80% by weight and said propylene oxide is present in said copolymer in a quantity of about 20% by weight (= Pluronic® L62LF, L72, L92, L122, 17R1, 25R1, 25R2, 31R1 and 31R2) [page 3, [0029]].

Since Hardikar teaches all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

Method

II. Claims 17-20 are rejected under 35 U.S.C. 102(e) as being anticipated by **Hardikar** (US Patent Application Publication No. 2004/0168928 A1).

Hardikar teaches a method of electroplating copper (page 4, [0036]) on an electroplating surface (page 5, [0042], esp., lines 8-11) comprising a copper seed layer (page 1, [0004]; and page 3, [0028], esp., line 5) to achieve improved wetting of said copper seed layer (page 3, [0028]) and improved deposition uniformity of said electroplated copper (page 3, [0026]), comprising the steps of:

(a) providing an electroplating surface comprising a copper seed layer (page 1, [0004]; and page 3, [0028], esp., line 5);

(b) providing an electroplating bath solution comprising a source of copper ions (= 67 g/L of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) [page 4, [0036]; and page 5, lines 3-7];

(c) mixing a suppressor additive copolymer consisting of ethylene oxide and propylene oxide with said solution (= 10 mL/L of 20% Pluronic®31R1) [page 3, [0029];

and page 5, lines 3-7] in a concentration of from about 50 ppm to about 500 ppm (= 0.001 to 10% by weight) [page 3, [0029]];

(d) providing an accelerator additive provided in said electroplating bath solution at a concentration less than said suppressor additive (= 7 mL/L of 0.1% of sodium salt of 3-mercaptopropane sulfonic acid) [page 4, [0033] to [0035]; and page 5, lines 3-7];

(e) immersing said electroplating surface comprising said seed layer in said solution to fully wet said copper seed layer in said solution (= distribution system) [page 1, [0015]; page 4, [0037] and [0039]]; and

(f) electroplating said copper onto said electroplating surface (page 2, [0024]).

The copolymer is a block copolymer (= block copolymers of ethylene oxide and propylene oxide) [page 3, [0029]].

The ethylene oxide is present in said copolymer in a quantity of at least about 60% by weight (= Pluronic® L62LF, L72, L92, L122, 17R1, 25R1, 25R2, 31R1 and 31R2) [page 3, [0029]].

The ethylene oxide is present in said copolymer in a quantity of about 80% by weight and said propylene oxide is present in said copolymer in a quantity of about 20% by weight (= Pluronic® L62LF, L72, L92, L122, 17R1, 25R1, 25R2, 31R1 and 31R2) [page 3, [0029]].

Since Hardikar teaches all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

I. Claims **5-8 and 11-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hardikar** (US Patent Application Publication No. 2004/0168928 A1) as applied to claims 1-4 and 9-10 above, and further in view of **Wang et al.** (US Patent Application Publication No. 2004/0249177 A1).

Hardikar is as applied above and incorporated herein.

The electrolyte of Hardikar differs from the instant invention because Hardikar does not disclose the following:

- a. Wherein said copolymer is a random copolymer, as recited in claim 5.
- b. Wherein said copolymer is an alternating copolymer, as recited in claim 7.

Like Hardikar, Wang teaches an electrolyte for copper electroplating. Wang teaches that a wide variety of compounds capable of suppressing copper plating are known. The EO/PO and EO/BO copolymers may be alternating, random or block copolymers (page 3, [0025]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the copolymer described by Hardikar with wherein said copolymer is a random copolymer; and wherein said copolymer is an alternating

copolymer because these copolymers would have been functionally equivalent as suppressors in an electrolyte for copper electroplating as taught by Wang (page 3, [0025]).

II. Claims **13-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hardikar** (US Patent Application Publication No. 2004/0168928 A1) in combination with **Wang et al.** (US Patent Application Publication No. 2004/0249177 A1).

Hardikar and Wang are as applied for reasons as discussed above and incorporated herein.

Hardikar also teaches a leveling agent provided in said electrolyte solution (page 2, [0016]).

The electrolyte of Hardikar differs from the instant invention because Hardikar does not disclose the following:

- a. Wherein the suppressor additive copolymer is not a block copolymer, as recited in claim 13.
- b. Wherein said copolymer is selected from the group consisting of a random copolymer and an alternating copolymer, as recited in claim 14.

Like Hardikar, Wang teaches an electrolyte for copper electroplating. Wang teaches that a wide variety of compounds capable of suppressing copper plating are known. The EO/PO and EO/BO copolymers may be alternating, random or block copolymers (page 3, [0025]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the block copolymers of ethylene oxide and propylene oxide described by Hardikar with wherein said copolymer is a random copolymer; and wherein said copolymer is an alternating copolymer because these copolymers would have been functionally equivalent as suppressors in an electrolyte for copper electroplating as taught by Wang (page 3, [0025]).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

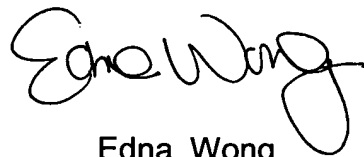
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Edna Wong whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read 'Edna Wong', with a stylized flourish at the end.

Edna Wong
Primary Examiner
Art Unit 1753